

LADAR Locks Onto Eye Movements

BMDO Technology Background

Autonomous Technologies (Orlando, FL) originally developed monopulse laser radar tracking techniques for military purposes. The company received three BMDO SBIR contracts to develop laser radar (LADAR) systems for missile tracking and space docking. Today, the company has extended that technology to photorefractive keratectomy (PRK), a procedure that can improve near-sightedness by modifying the shape of the cornea.

In 1993 Autonomous received private investor funding to develop its T-PRK[®] Alpha Unit. This unit was a direct result of a prototype LADAR eye tracker developed under a BMDO SBIR Phase II project.

How It Works

The surgical effectiveness of photorefractive keratectomy depends on accurate delivery of an excimer laser beam to the surface of the cornea. Tracking the continual, involuntary eye movements known as saccades improves this accuracy and reduces dependence on patient fixation of a target. Without the ability to track and compensate for this motion, the laser beam might unintentionally ablate the wrong tissue while sculpting the cornea.

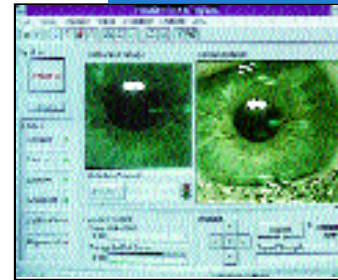
Autonomous Technologies has adapted object detection and ranging technology originally developed for missile targeting and space docking systems to track irregular eye movements. This eye tracking system, or LADARVision[™], is a key component of Autonomous Technologies' new medical laser product known as T-PRK[®]. This surgical laser device integrates a UV excimer laser to a LADAR-based tracking system. LADAR uses laser photons reflected from a specific object for tracking or imaging.

Potential Use to Medicine

T-PRK[™] is a valuable tool for the ophthalmologist who specializes in refractive surgery. It reduces the risk of inaccurate ablation caused by eye movement during laser firing. Six-month post-surgical data from a trial site in Greece show good results in procedures using T-PRK[®]. Preliminary data indicate that no significant loss of BCVA (best corrected visual acuity) had taken place, and minimal corneal haze, a frequent side effect of PRK, was noted. Endothelial cell density, a diminution of which would indicate cellular damage, was unaffected. Uncorrected visual acuity in 68 percent of treated eyes was 20/40 or better, with 20/20 rated as "perfect" visual acuity. Taken together, these data support the efficacy of T-PRK[®].

Product Status and Availability

In June 1994, Autonomous and CIBA Vision Ophthalmics, a producer of ophthalmic pharmaceuticals and a business unit of CIBA Vision, formed a strategic alliance to market T-PRK[®]. Autonomous began clinical trials for T-PRK[®] in two sites in Greece and plans to have units in place for U. S. trials by mid-1996. The company hopes to receive Food and Drug Administration approval for the device as soon as 1997 or 1998. Marketing for T-PRK[®] has begun in several other countries.



▲ T-PRK[®] helps make laser surgery for myopia safer and more accurate.

The company hopes to receive FDA approval for the device as soon as 1997 or 1998.